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Jiuzhi Xue

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EXAMINER

DUONG, THOI V

ART UNIT

PAPER NUMBER

2871

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/591,437

Applicant(s)

XUE ET AL.

Examiner

Thoi V Duong

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13 is/are allowed.
- 6) ☒ Claim(s) 1-10, 12 and 14-26 is/are rejected.
- 7) ☒ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. In view of the Appeal Brief filed December 04, 2003, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

2. Claims 1-26 are currently pending in this application.

### ***Claim Objections***

3. Claim 11 is objected to because of the following informalities: claim 11 recites the limitation "said continuous variation of the optical state of the light output" in line 2. There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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5. Claim 25 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim contains the limitation "wherein the ferroelectric liquid crystal material in the optical device is surface stabilized" which is failed to comply with the enablement requirement. According to USPN 6,141,076, Liu appears to disclose an optical device having a similar structure and alignment treatment with the claimed invention; therefore, it would have been obvious to one having ordinary skill in the art to expect the same results as the claimed invention. Since Liu's disclosure, which directs to a non-surface-stabilized ferroelectric liquid crystal, has been patented, Liu's disclosure presumes valid over the claimed invention.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 3-10, 14, 16-24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (USPN 4,778,259).

Re claims 1 and 14, as shown in Figs. 1 and 4, Liu discloses an optical device (as well as a method for preventing formation of chevron structures in the optical device) including a ferroelectric liquid crystal material 16, said optical device comprising:

a first substrate 10 and a second substrate 11;

a first alignment treatment applied to a surface of the first substrate, said first alignment treatment being intended to induce an orientation of at least a portion of said ferroelectric liquid crystal material along a first alignment direction 25 and with a first pretilt angle "alpha1" with respect to a plane parallel to said first substrate (Fig. 4 and col. 3, line 35 through col. 4, line 60);

a second alignment treatment applied to a surface of the second substrate, said second alignment treatment being intended to induce an orientation of at least another portion of said ferroelectric liquid crystal material along a second alignment direction 26 and with a second pretilt angle "alpha2" with respect to a plane parallel to said second substrate (Fig. 4 and col. 3, line 35 through col. 4, line 60),

wherein the first substrate is located with respect to the second substrate in such a way that the surfaces of the first and second substrates onto which the first and second alignment treatments were applied, respectively, are spaced apart, generally parallel and facing each other and a projection of the first alignment direction onto the treated surface of the first substrate makes a non-zero angle "omega" (or Liu's buffing angle) with respect to a projection of the second alignment direction onto the treated surface of the first substrate such that, said ferroelectric liquid crystal material being injected between the first and second substrates (Figs. 3A, 3B and 4; col. 4, lines 4-60).

Liu discloses a problem in Prior Art where a typical SSFLC (surface-stabilized ferroelectric liquid crystal) creates a "chevron" structure which resulted in a high transmission loss due to strong buffing when parallel rubbing is applied to the

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substrates (col. 1, lines 25-34 and col. 4, lines 36-46). Liu overcomes the problem by providing a ferroelectric liquid crystal structure wherein excellent contrast is obtained with weak buffing or even greater contrast provided with strong buffing (col. 4, lines 47-53). Accordingly, it is obvious that Liu creates a structure free of chevron without the need to otherwise apply an additional treatment to the optical device since buffing (weak or strong) is the only treatment in the optical device of Liu et al. to overcome a chevron or a quasi-bookshelf generated in parallel alignment case in some traditional configurations. In addition, Liu et al. also discloses that the buffing angles of the substrates are at an angle, with respect to one another, of less than 90 degrees, preferably at about 45 degrees (col. 4, lines 53-60). Accordingly, Liu also creates a cross-buffed optical device.

Re claims 3 and 16, said ferroelectric liquid crystal material has a cone angle "theta", said non-zero angle "omega" has a predetermined value such that "omega"  $\geq 2(\text{theta})$  and "omega" is different from 180 degrees (col. 4, lines 53-60).

Re claims 4, 17 and 21, said first and second alignment treatments are specifically chosen so as to specifically induce pretilt angles of "alpha1" and "alpha2" (Liu's angle theta 0) respectively (Fig. 4 and col. 4, lines 23-26), wherein said choosing step further includes the step of taking into consideration molecular anchoring properties of said first and second alignment treatments so as to choose first and second alignment treatments to specifically induce pretilt angles of "alpha 1" and "alpha 2", respectively, while providing strong molecular anchoring of at least portions of the

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ferroelectric liquid crystal material located immediately adjacent to the treated surfaces of the first and second substrates (col. 3, lines 36-45 and col. 4, lines 46-66).

Re claims 5 and 18, said first alignment treatment includes a coating of a selected alignment material, said coating being applied, cured and treated so as to specifically induce the pretilt angle of "alpha1" (col. 3, lines 31-45).

Re claims 6 and 19, said second alignment treatment includes a coating of another selected alignment material, said coating being applied, cured and treated so as to specifically induce the pretilt angle of "alpha2" (col. 3, lines 31-45 and col. 4, lines 23-26).

Re claims 8 and 20, said first and second alignment treatments are generally identical (col. 3, lines 31-45).

Re claim 7, each of said pretilt angles is between about 3 degrees and about 7 degrees (col. 8, lines 36-44); and

Re claim 9, said first and second alignment treatments provide strong molecular anchoring of at least portions of the ferroelectric liquid crystal material located immediately adjacent to the treated surfaces of the first and second substrates (col. 4, lines 46-52).

Re claims 10 and 22, as shown in Figs. 10A and 10B, an optical device of Liu further comprises a light input 1018 directed at said optical device in such a way that the optical device in turn produces a light output of a particular optical state; and means 1022 for electrically addressing said optical device in such a way that the particular

optical state of the light output is continuously variable between a minimum optical state (V-) and a maximum optical state (V+).

Re claims 23 and 24, Liu discloses that the first and second pretilt angles are non-zero (col. 4, lines 23-26 and col. 8, lines 42-44).

Re claim 26, Liu discloses an optical device comprising all limitations of claim 1, wherein the first and second substrates are spaced apart by a distance sufficiently small to suppress formation of helixes typically formed of the ferroelectric liquid crystal material (col. 3, lines 50-57).

8. Claims 2, 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (USPN 6,141,076) in view of Iwayama et al. (USPN 5,323,253).

Liu et al. discloses an optical device that is basically the same as that recited in claims 2, 12 and 15 except for a reflective display surface and a phase sequence of the ferroelectric liquid crystal material.

As shown in Fig. 3, Iwayama et al. discloses a ferroelectric liquid crystal device comprising a reflective display surface formed on a substrate (col. 5, lines 16-20), wherein the liquid crystal shows a phase sequence of Isotropic – Nematic - Smectic A - Smectic C\* - Crystalline states (col. 5, lines 52-59).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the optical device of Liu et al. with the teaching of Iwayama et al. by forming a reflective surface for a reflective display and employing a ferroelectric liquid crystal material having a phase sequence of Isotropic – Nematic -



Smectic A - Smectic C\* - Crystalline states for avoiding the change in cell thickness and the occurrence of liquid crystal void (col. 5, lines 64-68).

***Allowable Subject Matter***

9. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (see Reasons for Allowance below).

10. Claim 13 is allowed.

The following is an examiner's statement of reasons for allowance: none of the prior art of record fairly suggests or shows all of the limitations as claimed. Specifically,

None of the prior art of record discloses, in combination with other limitations as claimed, an optical device including a ferroelectric liquid crystal material having free of chevron structures without a need to otherwise apply an additional treatment to the optical device, wherein an optical retardance of the optical device remains generally constant during continuous variation of the optical state of the light output.

The most relevant reference, USPN 6,141,076 of Liu et al., fails to disclose or suggest a constant optical retardance of the optical device remained during continuous variation of the optical state of the light output. As shown in Figs. 10A and 10B, the Liu et al.'s reference only discloses that the particular optical state of the light output is continuously variable between a minimum optical state (V-) and a maximum optical state (V+) (col. 5, lines 40 through col. 6, line 12).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Response to Arguments***

11. Applicant's arguments filed December 04, 2003 have been fully considered but they are not persuasive.

Group A (Claims 1-10, 12 and 14-24): Applicant argued that Liu does not disclose a crossed-buffed device and a ferroelectric liquid crystal material being free of chevron structures without the need to otherwise apply an additional treatment to the optical device.

The Examiner disagrees with the Applicant's remarks since Liu discloses a problem in Prior Art where a typical SSFLC (surface-stabilized ferroelectric liquid crystal) creates a "chevron" structure which resulted in a high transmission loss due to strong buffing when parallel rubbing is applied to the substrates (col. 1, lines 25-34 and col. 4, lines 36-46). Liu overcomes the problem by providing a ferroelectric liquid crystal structure wherein excellent contrast is obtained with weak buffing or even greater contrast provided with strong buffing (col. 4, lines 47-53). Accordingly, it is obvious that Liu creates a structure free of chevron without the need to otherwise apply an additional treatment to the optical device since buffing (weak or strong) is the only treatment in the optical device of Liu et al. to overcome a chevron or a quasi-bookshelf generated in parallel alignment case in some traditional configurations. In addition, Liu et al. also discloses that the buffing angles of the substrates are at an angle, with respect to one

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another, of less than 90 degrees, preferably at about 45 degrees (col. 4, lines 53-60).

Accordingly, Liu also creates a cross-buffed optical device.

Group D (claim 26): Applicant argued that the limitation "sufficiently small spacing to suppress formation of helixes" is not found in Liu.

The Examiner disagrees since, as shown in Figs. 2A-2C, Liu discloses that the cell thickness 212 is designed to be thin and the surface anchoring is strong for suppressing formation of helixes (col. 3, lines 50-57).


### **Conclusion**

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim, can be reached at (571) 272-2293.

Thoi Duong 

11/26/2004

  
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